

LISTING OF CLAIMS

1. (currently amended) An automatic tracking method for a golf swing, comprising the following steps of:

attaching colored marks to plural positions including any one place of a golfer, which is a measurement objective, and at least one necessary position on a golf club that the golfer uses, before the golfer initiates a swing;

photographing a background image of a swing place in which a golfer is not photographed and a swing moving image from a scene at address of the golfer to the finish thereof with a camera as color images;

not only storing the photographed background image into a computer, but also storing plural still images converted from the swing moving image into the computer;

adopting, of the still images, a specific still image in which all the marks can be recognized as a reference image and storing reference color information and coordinate data (~~positional information~~) for positional information of each mark manually or automatically in advance;

setting, on a still image being considered, for each of the mark positions thereon, a search range, which is a region including the position of the predicted mark on a still image adjacent in chronological order to the still image being considered and a wait range which is a region larger than the search range, in consideration of a case where the marks would not be recognized in the search range and setting a color range of each mark that is an allowable range, in which colors can be regarded as the same as reference color information thereof;

changing the search range of the still image being considered to the wait range thereof in a case where a mark is hidden and not recognized in the search range thereof;

regarding a pixel, as a position of a mark, in a case where the absolute value of a difference between a color of the pixel in the still image being considered on which a differential processing has been conducted with the background image in the search range or the wait range and the reference color information falls within the color range and is the minimum of absolute values obtained from other pixels to conduct a color search and obtain coordinate data; and

automatically tracking the marks moving during the swing.

2. (original) The automatic tracking method for a golf swing according to claim 1, wherein the colored marks are provided at least two sites spaced from each other on the shaft of a golf club in the length direction thereof; and at least one site on a golfer selected from the head, the right and left shoulders, the right and left elbows, the right and left wrists, the right and left hips, the right and left knees, the right and left ankles and the right and left toes.
3. (original) The automatic tracking method for a golf swing according to claim 1, wherein in a case where a pixel which has the absolute value of a difference from the reference color information being in the color range and being the minimum of absolute values in the search range or the wait range is regarded as a position of a mark and coordinate data thereof is obtained, it is selectable whether or not a differential processing with the background image is conducted on each of the mark positions.
4. (original) The automatic tracking method for a golf swing according to claim 2, wherein in a case where a pixel which has the absolute value of a difference from the reference color information being in the color range and being the minimum of absolute values in the search range or the wait range is regarded as a position of a mark and coordinate data thereof is obtained, it is selectable whether or not a differential processing with the background image is conducted on each of the mark positions.
5. (currently amended) The automatic tracking method for a golf swing according to claim 1, wherein, of the plural marks, colors of marks having chances to be close to each other ~~or one another~~, or superimposed one on the other or one on another during a swing are differently set.
6. (currently amended) The automatic tracking method for a golf swing according to claim 2, wherein, of the plural marks, colors of marks having chances to be close to each other ~~or one another~~, or superimposed one on the other or one on another during a swing are differently set.
7. (currently amended) The automatic tracking method for a golf swing according to claim 3, wherein, of the plural marks, colors of marks having chances to be close to each other ~~or one another~~, or superimposed one on the other or one on another during a swing are differently set.

8. (original) The automatic tracking method for a golf swing according to claim 1, wherein one of the marks is adopted as a reference mark and tracked to measure a moving distance of the reference mark between still images at respective different time points, and in a case where another mark is tracked, a color search is conducted in a search range on a new still image corresponding to the another mark and the search range is moved by the moving distance of the reference mark.

9. (original) The automatic tracking method for a golf swing according to claim 2, wherein one of the marks is adopted as a reference mark and tracked to measure a moving distance of the reference mark between still images at respective different time points, and in a case where another mark is tracked, a color search is conducted in a search range on a new still image corresponding to the another mark and the search range is moved by the moving distance of the reference mark.

10. (original) The automatic tracking method for a golf swing according to claim 3, wherein one of the marks is adopted as a reference mark and tracked to measure a moving distance of the reference mark between still images at respective different time points, and in a case where another mark is tracked, a color search is conducted in a search range on a new still image corresponding to the another mark and the search range is moved by the moving distance of the reference mark.

11. (original) The automatic tracking method for a golf swing according to claim 5, wherein one of the marks is adopted as a reference mark and tracked to measure a moving distance of the reference mark between still images at respective different time points, and in a case where another mark is tracked, a color search is conducted in a search range on a new still image corresponding to the another mark and the search range is moved by the moving distance of the reference mark.

12. (original) The automatic tracking method for a golf swing according to claim 8, wherein a mark provided to the right wrist or the left wrist of a golfer, or a mark closer to a wrist of at least two marks provided on a shaft is adopted as a reference mark, and the another mark is provided on a shaft.

13. (original) The automatic tracking method for a golf swing according to claim 1, wherein in a case where a mark being considered cannot be recognized in a search range on a still image, the search range is changed to the wait range thereof on the same still image and a color search is conducted in the wait range other than the search range where the color search has been already conducted.

14. (original) The automatic tracking method for a golf swing according to claim 2, wherein in a case where a mark being considered cannot be recognized in a search range on a still image, the search range is changed to the wait range thereof on the same still image and a color search is conducted in the wait range other than the search range where the color search has been already conducted.

15. (original) The automatic tracking method for a golf swing according to claim 3, wherein in a case where a mark being considered cannot be recognized in a search range on a still image, the search range is changed to the wait range thereof on the same still image and a color search is conducted in the wait range other than the search range where the color search has been already conducted.

16. (original) The automatic tracking method for a golf swing according to claim 5, wherein in a case where a mark being considered cannot be recognized in a search range on a still image, the search range is changed to the wait range thereof on the same still image and a color search is conducted in the wait range other than the search range where the color search has been already conducted.

17. (original) The automatic tracking method for a golf swing according to claim 8, wherein in a case where a mark being considered cannot be recognized in a search range on a still image, the search range is changed to the wait range thereof on the same still image and a color search is conducted in the wait range other than the search range where the color search has been already conducted.